

Hossein Ali Mehralian¹ / Jafar Moghaddasi¹ / Hossein Rafiei²

The prevalence of potentially beneficial and harmful drug-drug interactions in intensive care units

¹ Community Oriented Nursing and Midwifery Research Center, Shahrekord University of Medical Sciences, Shahrekord, Iran

² Social Determinants of Health Research Center, Qazvin University of Medical Sciences, Qazvin, Iran, E-mail: Hosseinr21@gmail.com

Abstract:

Background: The present study was conducted with the aim of investigating the prevalence of potentially beneficial and harmful drug-drug interactions (DDIs) in intensive care units (ICUs).

Methods: The present cross-sectional prospective study was conducted in two ICUs in Shahr-e Kord city, Iran. The study sample was consisted of 300 patients. The *Drug Interaction Facts* reference text book [Tatro DS. Drug interaction facts. St Louis, MO: Walters Kluwer Health, 2010.] was used to determine the type and the frequency of the DDIs.

Results: The participants consisted of 189 patients men and 111 women. The mean age of patients was 44.2 ± 24.6 years. Totally, 60.5% of patients had at least one drug-drug interaction in their profile. The total number of DDIs found was 663 (the mean of the total number of drug-drug interactions was 2.4 interactions per patient). Of all the 663 interactions, 574 were harmful and others were beneficial. In terms of starting time, 98 of the potential interactions were rapid and 565 of them were delayed. In terms of severity, 511 of the potential interactions were moderate. Some of the drugs in the patients' medical records including phenytoin, dopamine, ranitidine, corticosteroid, dopamine, heparin, midazolam, aspirin, magnesium, calcium gluconate, and antibiotics, the type of ventilation, the type of nutrition and the duration of hospital stay were among the factors that were associated with high risk of potential DDIs ($p < 0.05$).

Conclusions: The prevalence of potentially beneficial and harmful DDIs, especially harmful drug-drug interactions, is high in ICUs and it is necessary to reduce these interactions by implementing appropriate programs and interventions.

Keywords: clinical pharmacology, critically ill patient, drug complications, harmful drug-drug interaction

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Introduction

A drug-drug interaction (DDI) occurs when the effect of a drug is altered by other drugs; it may affect the drug's pharmacokinetics or pharmacodynamics [1], [2]. The occurrence and the severity of a DDI is affected by many factors such as the number of prescribed drugs, treatment duration, patient's age, the number of physicians prescribing the drugs, and the stage of the disease [2], [3], [4]. Critically ill patients are particularly prone to DDIs, as they have several related risk factors such as older age, multidrug therapy, and long duration of hospital stay that this would significantly increase the probability of DDIs in this group of patients compared to others [2], [3], [4], [5], [6], [7], [8]. The role of drug safety and the prevention of DDIs in patients' health have drawn more attention in the last decade [9]. Complications such as prolonging the duration of a patient's hospital stay in the intensive care unit (ICU), increasing the cost of treatment, the negative impact on a patient's safety, and increasing mortality rate, are among the complications which are related to DDIs [8], [10], [11].

Due to the importance of DDIs in ICUs, researchers have paid great attention to this matter in recent years. In a study in 2018, Janković et al. investigated the prevalence of DDIs and its risk factors in ICU patients in Serbia. In their study, 201 patients were included. The results of Janković et al.'s study showed that the prevalence of DDIs in ICU patients is high [12]. In another study in Belgium in 2017, Vanham et al. investigated the prevalence of DDIs in ICUs in the country's ICUs. Potential DDIs were identified using three interaction checkers (Stockley's, Micromedex, and Epocrates). In total, Vanham et al. reported 1120 cases of DDIs, and concluded that patients

Hossein Rafiei is the corresponding author.
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